



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/916,701 | 07/26/2001 | Boon-Siew Ooi | 021040-000800US | 9267 |

20350 7590 09/30/2002

TOWNSEND AND TOWNSEND AND CREW, LLP
TWO EMBARCADERO CENTER
EIGHTH FLOOR
SAN FRANCISCO, CA 94111-3834

EXAMINER

MULPURI, SAVITRI

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

2812

DATE MAILED: 09/30/2002

5

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/916,701

Applicant(s)
Ooi et al

Examiner
Savitri Mulpuri

Art Unit
2812



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Aug 7, 2002
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above, claim(s) 3, 43, 45, and 46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-42, and 44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other:

Art Unit: 2812

DETAILED ACTION

This action is in response to the election process claims in paper no. 4 received 7/8/02 and product claims 3, 43, 45, 46 were withdrawn from consideration.

Claim Objections

Claim 33 is objected to because of the following informalities: claim 33, line 12 "mask 11 layer" and there is no layer as 'mask 11 layer" see the disclosure and figures.. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4- 5, 9-10, 12- 14, 16-17, 23-27, 31 are rejected under 35 U.S.C. 102(b) as

being anticipated by Poole et al (see publication by Poole et al, "superlattice and microstructure Vol. 15, no 4 1994").

Art Unit: 2812

Poole et al disclose a method of making a waveguide laser devices by ion induced quantum well intermixing: Forming quantum well layer comprising alternate active layer and barrier layer of AlGaAs/GaAs and InGaAs/ InP structures; implanting Ga, As P ions at dose of $2 \times 10^{11}/\text{cm}^2$ to $2 \times 10^{13}/\text{cm}^2$, at an implantation temperature as high as 200 C, which is considered as elevated temperature; performing RTA annealing at 800 C for 30 seconds. Poole et al further discloses implanting through cap layer of silicon nitride (see page 387, right col. , lines 1-4). Poole uses focus ion implantation (FIB) at 100 KeV and high energy implantation in the order MeV. for ion induced disordering in quantum well. Poole et al discloses QW band shift of as high 190 MeV.(see table 1).In Poole et al crystal site vacancy concentration must be inherent same as claimed in claim 4 because the implantation dose and temperatures and energy are same. See the whole document.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-8, 11, 15, 18-22, 28-30, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Poole et al in combination with Holonayak et al and Lam et al and Elman et al

Art Unit: 2812

Poole does teaches substantially same process as similar to instant claimed process. However, Poole et al does not teach the following limitations (1) introducing Xe ions (2) introducing impurity into upper and lower cladding layers such that impurity ions at least 0.5 microns from the upper barrier layer (3) annealing at different temperature and (4) introducing step employs implantation technique such that ions are introduced at least or equal to 0.5 microns away from the quantum well structures

Holnayak et al discloses a method of making optoelectronic device by ion induced disordering in quantum well structures by noble gas elements exemplified with Kr ions, which can be extrapolated to xenon ions and annealing different temperatures (see col. 1, lines 29-65 and col. 4, lines 4-25). It would have been obvious to one of ordinary skill in the art to anneal at different temperature depending on the desired degree of disordering in quantum well structures.

Lam et al discloses intermixing in InGaAs/InGaAsP quantum well structures in plasma immersion type noble gas such as Ar ion implantation (see abstract and detailed description. It would have been obvious to one of ordinary skill in the art to use quantum well structure made of materials suggested by Lam with Ar plasma in the invention Poole et al.

Elman et al disclose implanting ions into cladding layer and diffuse into quantum well structure by diffusion through heat treatment (see abstract and claim 1). It would have been obvious to one of ordinary skill in the art to use Elman et al procedure in the invention of Poole et al because Elman teaches band gap tuning can be obtained by implanting impurity into cladding layer.

None of the references explicitly teach the limitation of "introducing step employs implantation technique such that ions are introduced at least or equal to 0.5 microns away from the quantum well structures". However, such limitation is obvious and would be resulted in the modified invention of Poole et al because such results depend on the type of technique or experimental conditions such as implantation energy, or dose or implantation temperature.

Claims 33- 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Poole et al US 6,027,989 in combination with Poole et al (publication by Poole et al, "superlattice and microstructure Vol. 15, no 4 1994").

Poole patent discloses a method of making a silicon oxide mask with variable thickness on the surface of the laser structure and then perform focus beam ion implantation with P ions for obtaining variable degree of ion induced disordering for producing lasers with different wavelengths. Poole further teach strong dependence of band gap shift on ion implantation energy unto 2 MeV in InP based quantum well structures. Poole et al further discloses RTA annealing at a

Art Unit: 2812

temperature of 700 for 60 seconds. Poole patent does not disclose implantation at elevated temperature such as 200 C. Poole publication teaches implanting at a temperature at 200 C temperature. It would have been obvious to one of ordinary skill in the art to implant at elevated temperature such as the temperature taught in Poole publication because Poole et al teaches effective band gap tuning with blue shift of as high as 180 Mev for forming electronic integrated devices with lasers and waveguides and detectors (see the entire document).

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Prior art teach obtaining intermixing or ion induced disordering by several techniques such as implantation or plasma or FIB or PAID (photo-assisted) or pulse laser technique by using variety of impurities such as Ga, P, As, fluorine or argon by solid dopant diffusion by annealing or implantation in variety binary , tertiary or quaternary compound semiconductors.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Mulpuri whose telephone number is 305-5184. The fax phone number for the organization where this application or proceeding is assigned is 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-0956.


SAVITRI MULPURI
PRIMARY EXAMINER